USPS-RM2020-2/1

Public Material Supporting Proposal Ten

PREFACE

USPS-RM2020-2/1 provides the public supporting materials for the analysis provided by Professor Michael D. Bradley on behalf of the United States Postal Service. It includes the analysis data set used to estimate the econometric models, all programs for and results from the econometric analyses, all programs for and results from calculating the variabilities, and the public version of the impact analysis.

PURPOSE AND CONTENT

The purposes of USPS-RM2020-2/1 are four-fold. First, it describes and provides the operational Postmaster data set used to estimate the new variabilities. Second, it provides the SAS programs used in the various econometric exercises described in Professor Bradley's report, along with an explanation of what the program does, and the associated SAS logs and listings. Note that the SAS programs are internally self-documented. Third, it provides the SAS programs that calculate the new variabilities and, fourth, it provides the public version of the impact of the new study on attributable product costs.

CORRESPONDING NON-PUBLIC FOLDER

Submitted concurrently with this folder is a non-public folder USPS-RM2020-2/NP1 containing related non-public material. The non-public folder includes the Excel workbooks used to calculate the impact of the new study on competitive product costs.

ORGANIZATION

This document describes the steps performed in the variability estimation process, presents and describes the programs used in the estimation, and indicates where all the econometric results are located. It starts with the construction of the analysis data set, and then presents and discusses the programs used to estimate the preliminary variability models. The programs and results associated with estimating the logit models are then presented followed by presentation of the programs used to calculate the new variabilities. The last section presents and discusses the public version of the process for calculating the impact on product costs of the new study.

I. Constructing the Analysis Data Set

The raw operational data are extracted from the Form 150 data system for April 2019 in the form of an Excel workbook, entitled, "April WSC Data.xlsx," that includes a cross section of all of the post offices in the EAS system. The Excel workbook includes the EAS grade and Work Service Credits for each office. The SAS program, "Create April

2019 WSC SAS Data Set.sas," reads in the Excel workbook and converts the data to a SAS dataset, entitled, "apr_credits.sas7bdat," that is used in all subsequent analyses.

The raw data, the SAS data set, the SAS Logs and Listings (containing the results) are included in the 'Constructing the Analysis Data Set' directory. The produced files are listed below:

Create April 2019 WSC SAS Data Set.log Create April 2019 WSC SAS Data Set.lst

II. Preliminary Models

Four preliminary variability models were estimated. The programs for each model are presented and described below. The programs are internally self-documented.

1. Updating the Docket No. R84-1 Model

The first preliminary analysis is the re-estimation of the Docket No. R84-1 model on the April 2019 data and the calculation of the associated variability. This estimation requires finding the average Work Service Credits (WSCs) by EAS grade for the currently active grades, and regressing each grade's minimum salary on its average WSCs. The estimation is done by the SAS program entitled, "Reestimate Wang Model on FY 2019 Data.sas." The program reads in the Form 150 data, calculates the mean WSCs by grade, estimates the Docket No. R84-1 semi-log model, and calculates the associated variability. The SAS Logs and Listings (containing the results) are included in the 'Preliminary Models' directory. The produced files are listed below:

Reestimate Wang Model on FY 2019 Data.log
Reestimate Wang Model on FY 2019 Data.lst

2. Estimate the Docket No. R84-1 Model on All April 2019 Observations

The second preliminary model estimates the Docket No. R84-1 model on all of the individual post office observations rather than just on the EAS grade averages. The program reads in the Form 150 data, identifies the current post offices that match the Docket No. R84-1 data set, estimates the Docket No. R84-1 semi-log model using the individual post office observations, and calculates the associated variability. This estimation is done by the SAS program entitled, "Estimate Wang Model on all April Data Points.sas." The SAS Logs and Listings (containing the results) are included in the 'Preliminary Models' directory. The produced files are listed below:

Estimate Wang Model on all April Data Points.log
Estimate Wang Model on all April Data Points.lst

3. Estimate the Linear Probability Model

The third preliminary model estimates a linear probability model for the pay step between grade EAS-20 and grade EAS-21. The estimate is done by a SAS program entitled, "Linear probability model.sas," and the program produces a plot of the predicted values along with identifying the number of negative probabilities and the number of probabilities over one. The SAS Logs and Listings (containing the results) are included in the 'Preliminary Models' directory. The produced files are listed below:

Linear probability model.log Linear probability model.lst

4. Estimate the Log Probability Model

The fourth preliminary model estimates a log probability model for the pay step between grade EAS-20 and grade EAS-21. The estimate is done by a SAS program entitled, "Log probability model.sas," and the program produces a plot of the predicted values along with identifying the number of negative probabilities and the number of probabilities over one. The SAS Logs and Listings (containing the results) are included in the 'Preliminary Models' directory. The produced files are listed below:

Log probability model.log Log probability model.lst

III. Logit Models

The new variabilities are based upon a series of logit models, one for each EAS grade from EAS-18 through EAS-24. There are six logit models estimated and thus six different programs:

Logit Model For 18 and 18B.sas	Logit Model For 18B and 20.sas
Logit Model For 20 and 21.sas	Logit Model For 21 and 22.sas
Logit Model For 22 and 24.sas	Logit Model For 24 and 26.sas

Each model reads in the Form 150 data, selects the model to be estimated, omits extreme observations as explained in the Study Report, and estimates the relevant logit model. The SAS Logs and Listings (containing the results) are included in the 'Logit Models' directory. The produced files are listed below:

Logit Model For 18 and 18B.log	Logit Model For 18 and 18B.lst
Logit Model For 18B and 20.log	Logit Model For 18B and 20.lst
Logit Model For 20 and 21.log	Logit Model For 20 and 21.lst
Logit Model For 21 and 22.log	Logit Model For 21 and 22.lst
Logit Model For 22 and 24.log	Logit Model For 22 and 24.lst
Logit Model For 24 and 26.log	Logit Model For 24 and 26.lst

IV. Calculate Variabilities

The next set of programs calculate the variabilities associated with each of the logit models (EAS grades) and then investigates the sensitivities of those variabilities to variations in the size of the change in WSCs. The first set of models estimate the variabilities associated with a 10 percent increase in WSCs. There is one program for each logit model, so there are six such programs:

Calculate Variability For 18 and 18B.sas
Calculate Variability For 18B and 20.sas
Calculate Variability For 20 and 21.sas
Calculate Variability For 21 and 22.sas
Calculate Variability For 22 and 24.sas
Calculate Variability For 24 and 26.sas

These programs start with the logit program for the relevant EAS step and then define the WSC coefficient for variability calculation. Next, they calculate the post office probabilities of moving up an EAS grade for the base case and the WSC increase case. The probabilities are then used to identify the predicted EAS grade for each office in the base case and in the WSC growth case. Next, the salary costs for each case are calculated. The program finishes with calculating the office and costs shifts as well as the resulting variability. The SAS Logs and Listings (containing the results) are included in the 'Calculate Variabilities' directory. The produced files are listed below:

Calculate Variability For 18 and 18B.log
Calculate Variability For 18 and 18B.lst
Calculate Variability For 18B and 20.log
Calculate Variability For 18B and 20.lst
Calculate Variability For 20 and 21.log
Calculate Variability For 20 and 21.lst
Calculate Variability For 21 and 22.log
Calculate Variability For 21 and 22.lst
Calculate Variability For 22 and 24.log
Calculate Variability For 22 and 24.lst
Calculate Variability For 24 and 26.log
Calculate Variability For 24 and 26.lst

The next set of programs calculate the impact on the variabilities of changing the size of the initiating change in WSCs. There is one program for each logit model, so there are six such programs:

Sensitivity Analysis For 18 and 18B.sas
Sensitivity Analysis For 18B and 20.sas
Sensitivity Analysis For 20 and 21.sas
Sensitivity Analysis For 21 and 22.sas
Sensitivity Analysis For 22 and 24.sas
Sensitivity Analysis For 24 and 26.sas

The programs perform the sensitivity analysis by repeating the calculation from the "Calculate Variability" programs for the various WSC changes ranging from 2.5 percent to 20 percent.

The SAS Logs and Listings (containing the results) are included in the 'Calculate Variabilities' directory. The produced files are listed below:

Sensitivity Analysis For 18 and 18B.log
Sensitivity Analysis For 18 and 18B.lst
Sensitivity Analysis For 18B and 20.log
Sensitivity Analysis For 18B and 20.lst
Sensitivity Analysis For 20 and 21.log
Sensitivity Analysis For 20 and 21.lst

Sensitivity Analysis For 21 and 22.log	Sensitivity Analysis For 21 and 22.lst
Sensitivity Analysis For 22 and 24.log	Sensitivity Analysis For 22 and 24.lst
Sensitivity Analysis For 24 and 26.log	Sensitivity Analysis For 24 and 26.lst

There are two Excel workbooks used in the variability calculation analysis. The first, entitled, "Calculate Marginal Effects.xlsx," calculates the marginal effects, as explained in the Study Report, of increases of WSCs for various EAS grades. The second, entitled, "Calculating Weighted Variability.xlsx," calculates the cost-weighted overall variability associated with various-sized WSC changes.

Lastly, the folder includes the data and programs used to compare the 2019 values for Postmasters and WSCs with the 2018 values. The 2018 data is contained in the data set entitled, apr_2018_credits.sas7bdat. The SAS program that compares the values for the two years is "Compare 2018 and 2019 data.sas." The produced files are listed below:

Compare 2018 and 2019 data.log	Compare 2018 and 2019 data.lst

V. Estimate Impact of New Study on Product Costs (Public)

The impact of the new study on product cost is calculated in two steps. First, the new variabilities and cost pools are included in the Postmaster cost workbook. The public version with the new variabilities is entitled, "CS01-Public-FY18.Applying New Variabilities.xlsx."

Following the new study, there are now individual cost pools and variabilities for each of the relevant EAS grades, and grade EAS-24 has been moved from institutional cost to volume variable cost. These changes are made on rows 10 through 15 on Tab 1.0.1. The changes flow through the workbook, and the new Postmaster product-level volume variable costs are listed in the Outputs to the CRA tab.

The product-level volume variable Postmaster costs are read into the second workbook, entitled, "Public Impact Analysis.xlsx." The relevant Postmaster piggyback ratio is then applied to calculate the new product-level Postmaster costs including piggyback costs. These new costs are then divided by the relevant RPW volumes to calculate the new Postmaster volume variable costs per piece.

DIRECTORIES

USPS-RM2020-2/1 contains five directories.

1. Directory – Constructing the Analysis Data Set

This directory includes the analysis data set used to estimate the new Postmaster variabilities.

2. Directory – Preliminary Models

This directory includes the programs and results from the preliminary Postmaster models.

3. Directory – Logit Models

This directory includes the programs and results from the logit Postmaster models.

4. Directory – Calculate Variabilities

This directory includes the programs and results from calculating the new variabilities.

5. Directory – Impact Analysis

This directory includes the Excel workbooks used to perform the impact analysis.